

### II.3. Boston Phone Survey

In our interim report we presented preliminary results of a telephone survey conducted by sampling from the West Suburban Boston Telephone Directory for 1973. At that time we had completed 209 interviews of 304 attempted. In what follows we report on the expanded survey, which included an additional 200 attempts made from the Boston (Brookline, Cambridge, Somerville) 1973 telephone directory. This produced another 101 usable responses for a total sample size of 310. The response rate for the second sub-sample was substantially lower than the first. This is not unexpected, considering the different socio-economic composition of the two neighborhoods. Also there is higher mobility in the inner-city area--in part due to its higher share of transient students and other young people. (See Appendix II.A for survey form)

#### II.3.1. Sample Characteristics

The sample had the characteristics shown on the next page. Where the total cases reported is less than 310, it is due to a lack of information in some instances. The strategy of switching phonebooks to expand the low income representation in the sample was quite successful. Of the 100 additional responses, 28 were from those with family incomes under \$5,000 and only 2 from those with incomes over \$20,000. Even so, the sample remains very much younger, and higher in income, education and occupational status than the area population as a whole.

## SAMPLE CHARACTERISTICS: BOSTON PHONE SURVEY

| <u>Age</u> |    | <u>Education</u>              |    |
|------------|----|-------------------------------|----|
| 0 - 20     | 12 | Higher Degree                 | 64 |
| 21 - 30    | 82 | College Degree                | 93 |
| 31 - 40    | 65 | Some Post-Secondary           | 64 |
| 41 - 50    | 65 | High School Degree            | 72 |
| 51 - 60    | 48 | Grade School degree           | 11 |
| 60+        | 37 | Less than grade school degree | 4  |

| <u>Family Size</u> | <u>Family Income</u> |                  |
|--------------------|----------------------|------------------|
| 1                  | 56                   | Under \$3,000 31 |
| 2                  | 69                   | \$3-5,000 19     |
| 3                  | 49                   | \$5-10,000 51    |
| 4                  | 61                   | \$10-15,000 69   |
| 5                  | 38                   | \$15-20,000 55   |
| 6                  | 19                   | \$20-25,000 24   |
|                    |                      | Over \$25,000 53 |

| <u>Occupation</u>  |    |
|--------------------|----|
| Professionals      | 46 |
| Teachers           | 25 |
| Managers           | 37 |
| Clerical/Technical | 52 |
| Skilled Workers    | 26 |
| Unskilled Workers  | 12 |
| Housewives         | 61 |
| Retired            | 26 |
| Students           | 20 |

### II.3.2. Response Frequencies

These samples characteristically mean that the simple frequencies of the responses cannot be easily related to the underlying characteristics of the sampled population. We appear to have substantial sampling bias due to the tendency of upper income/education people to respond more readily to the survey. A brief review of the response patterns is in order, however, as a background to the cross-tabulations which provide the more crucial evidence for our purposes.

When asked to pick the three most important public issues (Table II.3) from a list of 8, people seemed quite clearly to put environment second to education. This is noticeable both in the total number of responses and from the order in which they were mentioned. In retrospect the question was not well phrased because "education" may well have meant different things to different respondents. To some it probably signified traditional questions of "quality" and for others it was probably connected to integration, race relations, bussing and so on.

When asked to name the most serious environmental problem in an unstructured context, the most popular responses were as follows:

|                      |    |
|----------------------|----|
| air pollution        | 78 |
| automobiles          | 57 |
| water pollution      | 50 |
| industrial pollution | 20 |
| trash                | 14 |
| apathy/attitudes     | 14 |

Of other problems, 2 mentioned aesthetic, 4 urban blight, 2 land-use, 3 noise, 1 pesticides, 5 overpopulation and 8 said the energy shortage. These results do suggest that there is somewhat more concern with air

Table II.3

PERCEPTIONS OF MOST IMPORTANT PUBLIC ISSUE:  
BOSTON PHONE SURVEY

|               | <u>1st</u> <u>Response</u> | <u>2nd</u> <u>Response</u> | <u>3rd</u> <u>Response</u> | <u>Total</u> |
|---------------|----------------------------|----------------------------|----------------------------|--------------|
| Welfare       | 39                         | 20                         | 17                         | 76           |
| Education     | 107                        | 30                         | 8                          | 185          |
| Housing       | 33                         | 23                         | 20                         | 76           |
| Environment   | 37                         | 77                         | 20                         | 134          |
| Health        | 36                         | 55                         | 42                         | 133          |
| Price Control | 7                          | 37                         | 47                         | 91           |
| World Peace   | 9                          | 26                         | 69                         | 104          |
| Law and Order | 28                         | 20                         | 48                         | 96           |

than water problems in our sample--particularly if we consider automobiles in the former category.

However, in a closed choice question 28% mentioned air pollution, 24% water pollution, and 21% trash and garbage as the most serious environmental problems, with no other response made in more than 10% of the cases. Asked to make another selection from the list, an additional 22% chose water pollution, 17% mentioned food additives (6% first time), 14% pesticides (3% first time), 13% trash, and 9% each air pollution and noise. Together these data imply that concern with water pollution is widespread, if not perhaps as close to the surface of many individual's consciousness as are some other issues.

When asked in an open-ended framework who should pay for pollution control, many individuals gave multiple responses. A significant number changed the meaning of the question from normative to descriptive and asserted that everyone would pay. The distribution of answers is shown in Table II.4A. These responses show a clear preference for federal financing if government action is chosen. A substantial number responded that everyone either will or should pay, presumably either through taxes or price increases. Yet relatively few individuals make that suggestion specifically. There is also substantial sentiment for having "the polluter" pay.

When we asked how this cleanup should be financed, the two most popular suggestions were for taxation or a diversion from other expenditures. A significant minority wanted to place the burden on

Table II.4A

PREFERRED SOURCE OF PAYMENT:  
BOSTON PHONE SURVEY

|                    | <u>1st</u> | <u>Response</u> | <u>2nd</u> | <u>Response</u> | <u>3rd</u> | <u>Response</u> | <u>Total</u> |
|--------------------|------------|-----------------|------------|-----------------|------------|-----------------|--------------|
| Local Government   |            | 20              |            | 15              |            | 3               | 38           |
| State Government   |            | 18              |            | 12              |            | 1               | 31           |
| Federal Government |            | 65              |            | 28              |            | 10              | 103          |
| All Government     |            | 35              |            | 11              |            | 3               | 49           |
| Taxpayers          |            | 20              |            | 11              |            | 3               | 34           |
| Consumers          |            | 7               |            | 5               |            | 2               | 14           |
| Everyone           |            | 52              |            | 16              |            | 3               | 71           |
| Everyone Will      |            | 30              |            | 6               |            | 0               | 36           |
| The polluter       |            | 59              |            | 31              |            | 15              | 105          |

the polluter. Again, multiple responses were frequent. Also, 20 people were not able to make a specific suggestion, and 17 gave no codable response. See Table II.4B.

Given this response pattern, it is not surprising that 90% of the respondents said that they would be willing to pay for a cleaner environment. When probed to pick a range of annual tax payments they would accept, we found the following:

|                |    |
|----------------|----|
| Less than \$10 | 45 |
| \$10-\$50      | 78 |
| \$51-\$100     | 55 |
| \$101-\$200    | 43 |
| Over \$200     | 37 |
| Don't know     | 52 |

Thus about 1/4 of the sample was willing to pay over \$100 for a cleaner environment, and about 1/2 less than \$50.

We also asked an open-ended question on the nature of water pollution. That is, we asked what came to mind when they heard the term. Many clearly had difficulty conceptualizing their impressions, while others gave multiple responses. The answers fell into two broad categories, those who responded by mentioning sources of pollution and those who focussed on ambient effects. In the former category, it is clear that industrial wastes are most immediately called to mind, as well as trash and garbage. Municipal wastes are not as readily identified with water pollution. Among the effects mentioned, health hazards, injuries to marine life, and odors are the most frequent responses. (See table II.5)

In asking questions about the Charles River, we found almost 95% of the sample thought the river polluted. About 76% thought it could be cleaned up, although only approximately 50% thought the river would be cleaned up. Of the 30% who didn't

Table II.4B

PREFERRED METHOD OF PAYMENT:  
BOSTON PHONE SURVEY

|                     | <u>1st Response</u> | <u>2nd Response</u> | <u>3rd Response</u> | <u>4th Response</u> | <u>Total</u> |
|---------------------|---------------------|---------------------|---------------------|---------------------|--------------|
| Higher Prices       | 22                  | 7                   | 2                   | 0                   | 31           |
| Higher Taxes        | 95                  | 21                  | 4                   | 0                   | 120          |
| Divert Expenditures | 90                  | 22                  | 5                   | 2                   | 119          |
| Gov't Subsidy       | 9                   | 8                   | 0                   | 0                   | 17           |
| Polluter Profits    | 17                  | 11                  | 0                   | 0                   | 38           |
| Charge Polluter     | 40                  | 33                  | 10                  | 4                   | 87           |



Table II.5

PERCEPTION OF WATER POLLUTION:  
BOSTON PHONE SURVEY

|                     | <u>1st Response</u> | <u>2nd Response</u> | <u>3rd Response</u> | <u>4th Response</u> | <u>Total</u> |
|---------------------|---------------------|---------------------|---------------------|---------------------|--------------|
| General Mess        | 38                  | 8                   | 5                   | 3                   | 54           |
| Trash/Garbage       | 28                  | 33                  | 12                  | 4                   | 77           |
| Municipal Wastes    | 17                  | 20                  | 13                  | 9                   | 59           |
| Industrial Wastes   | 63                  | 28                  | 9                   | 0                   | 100          |
| Oil Spills          | 11                  | 10                  | 6                   | 1                   | 28           |
| Detergent           | 6                   | 0                   | 0                   | 0                   | 6            |
| Thermal Effects     | 0                   | 2                   | 0                   | 2                   | 4            |
| Odors               | 10                  | 22                  | 5                   | 3                   | 40           |
| Noxious/Toxic       | 12                  | 11                  | 6                   | 1                   | 30           |
| Poor Fishing        | 6                   | 5                   | 3                   | 2                   | 16           |
| Algae/Slime         | 10                  | 7                   | 1                   | 1                   | 19           |
| Unhealthy Bacteria  | 39                  | 16                  | 2                   | 3                   | 60           |
| Injured Marine Life | 12                  | 13                  | 18                  | 0                   | 43           |

think cleanup would occur (20% didn't know), 3/4 gave political problems or human nature as the obstacle.

### II.3.3. The Determinants of Willingness to Pay

The most important data we have obtained from the survey are contained in Tables II.6, II.7, and II.8. These provide cross-tabulations of willingness to pay against income, education and occupation. We will consider each in turn.

The results on income are striking. For example, while only 6 of 76 respondents with annual family income under \$10,000 are willing to pay over \$100, 74 of the 179 sampled individuals whose annual family income was over \$10,000 said they were willing to pay such amounts. Similarly, 25 of 75 in the first category were willing to pay less than \$10, and only 20 of 179 in the second category expressed such views.

These data obviously have to be interpreted with some care, since only hypothetical questions are being asked. Furthermore, the presence of students in the sample complicates the analysis since they are often not fully independent spending units. This fact, together with their expectations of higher future income may well influence their responses. This combination of circumstances would appear to be behind some of the low-income/high willingness to pay observations.

Keeping these qualifications in mind, the data reveal a willingness to pay which rises proportionately faster than income in the annual family income range of \$5,000 - \$20,000, where much of the population

TABLE II.6

CROSSTABULATION OF FAMILY INCOME:WILLINGNESS TO PAY: BOSTON PHONE SURVEY

|                      | Less Than \$10 | \$10-50 | \$51-100 | \$101-200 | Over \$200 | ROW<br>TOTAL |
|----------------------|----------------|---------|----------|-----------|------------|--------------|
| <u>Family Income</u> |                |         |          |           |            |              |
| under \$3000         | 5              | 7       | 3        | 1         | 1          | 17           |
| \$3-5000             | 5              | 10      | 1        | 0         | 0          | 16           |
| \$5-10000            | 15             | 15      | 9        | 4         | 0          | 43           |
| \$10-15000           | 7              | 21      | 15       | 14        | 2          | 59           |
| \$15-20000           | 7              | 10      | 10       | 13        | 11         | 51           |
| \$20-25000           | 2              | 4       | 3        | 6         | 6          | 21           |
| Over \$25000         | 4              | 10      | 12       | 5         | 17         | 48           |
| Column Total         | 45             | 77      | 53       | 43        | 37         | 255          |

is to be found. This is so even given the conservative assumption that all "over \$200" responses mean \$250, and that all income recipients in a class are to be found at the midpoint. Given the income distribution in the sample, it is more likely that the average in the \$5-10,000 class is above \$17,500 and that in the \$15-20,000 class below \$17,500. On the strict assumption the income elasticity of willingness to pay in this range is 1.15. On slightly different ones it is 1.25. Our data do also suggest that the income elasticity is lower at both higher and lower income ranges--i-e., that willingness to pay is an "S" shaped function of income. The student problem and the limited number of response categories do make this difficult to reliably analyze, however.

The relationship of willingness to pay to education is similarly very strong. Only 8 of 64 who had no education beyond high school are willing to pay more than \$100, while 37 of 54 with higher degrees expressed such willingness (Table II.7).

The role of occupation is also very clear (Table II.8). Of those in the professional, teacher/manager categories, 45 of 96 expressed a willingness to pay over \$100. In the clerical/technical skilled/unskilled categories, 19 of 77 had the same views. The low willingness to pay of housewives is also striking.

Obviously income, education and occupation are not randomly associated in our population. To more effectively disentangle these inter-relationships, we ran a regression analysis with these and other independent variables and willingness to pay as the dependent variable. The results need

Table II.7

CROSSTABULATION OF EDUCATION:WILLINGNESS TO PAY: BOSTON PHONE SURVEY

| <u>Education</u>       | <u>WILLINGNESS TO PAY: BOSTON PHONE SURVEY</u> |         |          |           |            | ROW<br>TOTAL |
|------------------------|--|---------|----------|-----------|------------|--------------|
|                        | Less than \$10                                 | \$10-50 | \$51-100 | \$101-200 | Over \$200 |              |
| Higher Degree          | 2  | 11      | 14       | 15        | 12         | 54           |
| College Degree         | 12   | 20      | 22       | 14        | 17         | 85           |
| Some Post<br>Secondary | 11   | 21      | 8        | 10        | 4          | 54           |
| High School            | 17   | 19      | 10       | 4         | 3          | 53           |
| Grade School           | 2  | 4       | 1        | 0         | 0          | 7            |
| Less                   | 1  | 2       | 0        | 0         | 1          | 4            |
| Column Total           | 45   | 77      | 55       | 43        | 37         | 257          |

Table II.8

CROSSTABULATION OF OCCUPATION:  
WILLINGNESS TO PAY: BOSTON PHONE SURVEY

|                    | Less than \$10 | \$10-50 | \$51-100 | \$101-200 | Over \$200 | ROW<br>TOTAL |
|--------------------|----------------|---------|----------|-----------|------------|--------------|
| <u>Occupation</u>  |                |         |          |           |            |              |
| Professionals      | 5              | 4       | 9        | 13        | 9          | 40           |
| Teachers           | 2              | 3       | 6        | 4         | 5          | 20           |
| Managers           | 2              | 10      | 10       | 6         | 8          | 36           |
| Clerical/Technical | 6              | 17      | 10       | 9         | 3          | 45           |
| Skilled Workers    | 2              | 10      | 3        | 2         | 3          | 20           |
| Unskilled Workers  | 6              | 3       | 1        | 2         | 0          | 12           |
| Housewives         | 11             | 17      | 13       | 3         | 4          | 48           |
| Retired            | 7              | 6       | 0        | 1         | 3          | 17           |
| Students           | 3              | 6       | 3        | 3         | 1          | 16           |
| Column Total       | 44             | 76      | 55       | 43        | 36         | 254          |

to be interpreted with caution since we had coded income, education, occupation and willingness to pay along integer scales and that was the form in which the analysis was performed. The resulting equation was:

$$\begin{array}{rclclcl}
 W = 2.51 Y & - & .198 \text{ Ed} & - & .046 \text{ Occ} & - & .521 \text{ Sex} \\
 (.0471) & & (.0697) & & (.0335) & & (.149) \\
 & & & & & & \\
 & - & .494 \text{ Env. Sal.} & & R^2 & = & .296 \\
 & & (.145) & & & & 
 \end{array}$$

All coefficients are of the expected sign and all, except occupation, are highly significant. The insignificance of occupation is probably due to the unfortunate scaling of that variable. The Env. Sal. (environmental salience) variable is a dummy which is 0 if environment was mentioned as one of the three most important public issues and 1 if it was not.

Clearly also, there is very great variety of taste within various groups. Thus, in addition to any effects on average among, say, income classes, environmental protection measures will have significant redistributive effects within each such group.

In trying to explore these results we also cross-tabulated the number of respondents in each income and education category by whether or not they listed the environment as one of the most serious public issues. As can be seen from Table II.9, environmental concern appears greatest in the middle income range (\$10-\$20,000) and middle education range (Table II.10). Do note, however, that college students are in the "some post-secondary" category.

In a similar fashion, we have cross-tabulated income, education and occupation against what the subject thought was the most serious

Table II.9  
 CROSSTABULATION OF INCOME BY  
 SALIENCE OF ENVIRONMENTAL ISSUES  
 BOSTON PHONE SURVEY

|                      | Environment<br>Salient | Environment Not<br>Salient | Row<br>Total |
|----------------------|------------------------|----------------------------|--------------|
| <hr/>                |                        |                            |              |
| <u>Family Income</u> |                        |                            |              |
| Under \$3,000        | 9                      | 22                         | 31           |
| \$3-5,000            | 7                      | 12                         | 19           |
| \$5-10,000           | 22                     | 29                         | 51           |
| \$10-15,000          | 32                     | 37                         | 69           |
| \$15-20,000          | 31                     | 24                         | 55           |
| \$20-25,000          | 11                     | 13                         | 24           |
| Over \$25,000        | 21                     | 32                         | 53           |
| <hr/>                |                        |                            |              |
| Column Total         | 133                    | 169                        | 302          |



Table II.10  
 CROSSTABULATION OF EDUCATION  
 SALIENCE OF ENVIRONMENTAL ISSUES  
 BOSTON PHONE SURVEY

|                     | Environment<br>Salient | Environment Not<br>Salient | Row<br>Total |
|---------------------|------------------------|----------------------------|--------------|
| <hr/>               |                        |                            |              |
| <u>Education</u>    |                        |                            |              |
| Higher Degree       | 26                     | 38                         | 64           |
| College Degree      | 52                     | 41                         | 93           |
| Some Post Secondary | 31                     | 33                         | 64           |
| High School         | 20                     | 52                         | 72           |
| Grade School        | 4                      | 7                          | 11           |
| Less                | 0                      | 4                          | 4            |
| <hr/>               |                        |                            |              |
| Column Total        | 133                    | 175                        | 308          |

environmental problem in both unstructured and structured contexts.

(In the latter the interviewer presented the list of categories to be chosen from). In examining these results, as presented in Table II.11 through II.16, several clear results appear. First, a concern with "automobiles" on the unstructured responses is associated with lower status income positions while a concern with air pollution displays exactly the opposite pattern.

In addition, there is substantially more concern expressed about water pollution on the structured than on the unstructured question. In the unstructured question (in contrast to air pollution) that concern peaks in the middle income range and shows little clear relationship to either education or occupation--except that teachers did mention it relatively more frequently than other groups (See tables II.11 - II.13). On the structured question, we see a fairly similar response (see tables II.14 - II.16). Note, however, how many more individuals in the top income bracket mention water pollution in the structured versus open question (18 vs. 7). Almost half of those whose first round response was excluded from the list (which was a bit less than half of this income group) mentioned water pollution in the more limited context.

TABLE II.11

## CROSSTABULATION OF INCOME BY MOST SERIOUS ENVIRONMENTAL

PROBLEM: UNSTRUCTURED RESPONSE - BOSTON PHONE SURVEY

| Family<br>Income | Air<br>Pollution | Water<br>Pollution | Trash/<br>Garbage | Noise | Ugliness | Industrial<br>Pollution | All/<br>Pollution |      | Attitudes/<br>Rhetoric | Resource<br>Depletion | Energy Short-<br>age |       | Row<br>Total |
|------------------|------------------|--------------------|-------------------|-------|----------|-------------------------|-------------------|------|------------------------|-----------------------|----------------------|-------|--------------|
|                  |                  |                    |                   |       |          |                         | In General        | Cars |                        |                       | Other                | Total |              |
| Under<br>\$3,000 | 6                | 1                  | 1                 | 0     | 0        | 2                       | 1                 | 8    | 3                      | 1                     | 1                    | 1     | 25           |
| \$3-<br>5000     | 3                | 1                  | 0                 | 2     | 0        | 1                       | 3                 | 7    | 1                      | 0                     | 0                    | 0     | 18           |
| \$5-<br>1000     | 12               | 6                  | 3                 | 1     | 1        | 5                       | 3                 | 11   | 1                      | 0                     | 0                    | 2     | 45           |
| \$10-<br>1500    | 19               | 15                 | 2                 | 0     | 0        | 7                       | 2                 | 9    | 2                      | 0                     | 2                    | 10    | 68           |
| \$15-<br>20000   | 15               | 14                 | 3                 | 0     | 1        | 1                       | 1                 | 10   | 3                      | 2                     | 2                    | 3     | 55           |
| \$20-<br>25000   | 5                | 6                  | 2                 | 0     | 0        | 1                       | 2                 | 3    | 3                      | 1                     | 1                    | 1     | 24           |
| Over<br>25000    | 17               | 7                  | 4                 | 0     | 0        | 2                       | 3                 | 5    | 5                      | 4                     | 2                    | 4     | 53           |
| column<br>total  | 77               | 50                 | 14                | 3     | 2        | 19                      | 15                | 53   | 18                     | 8                     | 8                    | 21    | 289          |

TABLE II. 12

## CROSSTABULATION OF EDUCATION BY MOST SERIOUS ENVIRONMENTAL

PROBLEM: UNSTRUCTURED RESPONSE - BOSTON PHONE SURVEY

|                           | Air<br>Pollution | Water<br>Pollution | Trash/<br>Garbage | Noise | Ugliness | Industrial<br>Pollution | Air/<br>Pollution<br>In General | Cars | Attitudes/<br>Rhetoric | Resource<br>Depletion | Energy<br>Short<br>-age | Other | Row<br>Total |
|---------------------------|------------------|--------------------|-------------------|-------|----------|-------------------------|---------------------------------|------|------------------------|-----------------------|-------------------------|-------|--------------|
|                           |                  |                    |                   |       |          |                         |                                 |      |                        |                       |                         |       |              |
| higher<br>Degree          | 24               | 12                 | 2                 | 1     | 0        | 1                       | 4                               | 8    | 3                      | 3                     | 3                       | 2     | 63           |
| college<br>Degree         | 21               | 16                 | 4                 | 6     | 1        | 7                       | 4                               | 14   | 9                      | 2                     | 3                       | 10    | 91           |
| some Post<br>condary      | 16               | 11                 | 6                 | 1     | 0        | 3                       | 3                               | 10   | 2                      | 2                     | 0                       | 8     | 62           |
| high<br>School            | 11               | 10                 | 2                 | 1     | 1        | 8                       | 3                               | 20   | 4                      | 0                     | 2                       | 1     | 63           |
| grade<br>School           | 5                | 0                  | 0                 | 0     | 0        | 0                       | 1                               | 3    | 1                      | 0                     | 0                       | 0     | 10           |
| less than<br>grade School | 1                | 1                  | 0                 | 0     | 0        | 1                       | 0                               | 1    | 0                      | 1                     | 0                       | 0     | 4            |
| Column Total              | 78               | 50                 | 14                | 3     | 2        | 20                      | 15                              | 55   | 19                     | 8                     | 8                       | 21    | 293          |

TABLE II, 13

CROSSTABULATION OF OCCUPATION BY MOST SERIOUS ENVIRONMENTAL

PROBLEM: UNSTRUCTURED RESPONSE - BOSTON PHONE SURVEY

| Occupations            | Air<br>Pollution | Water<br>Pollution | Trash/<br>Garbage | Noise | Ugliness | Industrial<br>Pollution | All/<br>Pollution<br>In General | Cars | Attitudes/<br>Rhetoric | Resource<br>Depletion | Energy<br>Short-<br>age | Other | Row<br>Total |
|------------------------|------------------|--------------------|-------------------|-------|----------|-------------------------|---------------------------------|------|------------------------|-----------------------|-------------------------|-------|--------------|
| Professionals          | 20               | 8                  | 0                 | 0     | 0        | 0                       | 2                               | 2    | 3                      | 4                     | 2                       | 4     | 45           |
| Teachers               | 5                | 8                  | 1                 | 0     | 0        | 0                       | 2                               | 4    | 1                      | 0                     | 1                       | 2     | 24           |
| Managers               | 12               | 7                  | 5                 | 0     | 0        | 1                       | 1                               | 6    | 1                      | 0                     | 2                       | 2     | 37           |
| Clerical/<br>Technical | 15               | 7                  | 5                 | 0     | 2        | 4                       | 4                               | 10   | 2                      | 2                     | 0                       | 5     | 51           |
| Skilled<br>Workers     | 7                | 5                  | 0                 | 0     | 0        | 4                       | 0                               | 5    | 3                      | 0                     | 0                       | 0     | 24           |
| Unskilled<br>Workers   | 0                | 3                  | 0                 | 1     | 0        | 1                       | 0                               | 4    | 1                      | 0                     | 0                       | 0     | 10           |
| Housewives             | 10               | 10                 | 4                 | 0     | 0        | 5                       | 5                               | 15   | 3                      | 0                     | 2                       | 3     | 57           |
| Retired                | 5                | 3                  | 0                 | 1     | 0        | 3                       | 1                               | 6    | 2                      | 0                     | 1                       | 2     | 24           |
| Students               | 4                | 2                  | 0                 | 1     | 0        | 2                       | 0                               | 2    | 3                      | 2                     | 0                       | 3     | 19           |
| Column Total           | 78               | 50                 | 13                | 3     | 2        | 20                      | 15                              | 54   | 19                     | 8                     | 8                       | 21    | 291          |

TABLE II.14

## CROSSTABULATION OF INCOME BY PERCEIVED MOST SERIOUS ENVIRONMENTAL PROBLEM

## STRUCTURED RESPONSE - BOSTON PHONE SURVEY

| Family Income | Air<br>Pollution | Trash/<br>Garbage | Noise | Ugliness | Water<br>Pollution | Pesticides | Food<br>Additives | Row Total |
|---------------|------------------|-------------------|-------|----------|--------------------|------------|-------------------|-----------|
| Under \$3000  | 10               | 5                 | 1     | 0        | 8                  | 2          | 3                 | 29        |
| \$3-5000      | 5                | 6                 | 1     | 1        | 5                  | 0          | 0                 | 18        |
| \$5-10000     | 12               | 11                | 10    | 1        | 12                 | 2          | 2                 | 50        |
| \$10-14000    | 20               | 16                | 5     | 3        | 14                 | 2          | 7                 | 67        |
| \$15-20000    | 16               | 11                | 5     | 6        | 8                  | 3          | 1                 | 50        |
| \$20-25000    | 7                | 6                 | 2     | 1        | 6                  | 0          | 0                 | 22        |
| Over \$25000  | 15               | 9                 | 5     | 1        | 18                 | 1          | 3                 | 52        |
| Column Total  | 85               | 64                | 29    | 13       | 71                 | 10         | 16                | 289       |

TABLE II. 15  
CROSSTABULATION OF EDUCATION BY PERCEIVED MOST SERIOUS ENVIRONMENTAL  
PROBLEM: STRUCTURAL RESPONSE: BOSTON PHONE SURVEY

| Education              | Air<br>Pollution | Trash/<br>Garbage | Noise | Ugliness | Water<br>Pollution | Pesticides | Food<br>Additives | Other | Row<br>Total |
|------------------------|------------------|-------------------|-------|----------|--------------------|------------|-------------------|-------|--------------|
| Higher Degree          | 19               | 14                | 4     | 5        | 14                 | 3          | 1                 | 4     | 64           |
| College Degree         | 31               | 18                | 11    | 3        | 17                 | 3          | 6                 | 3     | 92           |
| Some Post<br>Secondary | 14               | 12                | 9     | 2        | 22                 | 2          | 2                 | 1     | 64           |
| High School            | 21               | 15                | 5     | 2        | 17                 | 2          | 6                 | 3     | 71           |
| Grade School           | 1                | 4                 | 0     | 0        | 3                  | 0          | 2                 | 1     | 11           |
| Less                   | 0                | 2                 | 1     | 1        | 0                  | 0          | 0                 | 0     | 4            |
| Column Total           | 86               | 65                | 30    | 13       | 73                 | 10         | 17                | 12    | 306          |

TABLE II. 16

CROSSTABULATION OF OCCUPATION BY PERCEIVED MOST SERIOUS ENVIRONMENTAL

PROBLEM: STRUCTURED RESPONSE: BOSTON PHONE SURVEY

| Occupation             | Air<br>Pollution | Trash/<br>Garbage | Noise | Ugliness | Water<br>Pollution | Pesticides | Food<br>Additives | Other | Row<br>Total |
|------------------------|------------------|-------------------|-------|----------|--------------------|------------|-------------------|-------|--------------|
| Professional           | 14               | 9                 | 2     | 5        | 12                 | 0          | 6                 | 4     | 46           |
| Teacher                | 12               | 3                 | 2     | 1        | 4                  | 2          | 0                 | 1     | 25           |
| Manager                | 11               | 3                 | 8     | 2        | 10                 | 1          | 0                 | 1     | 36           |
| Clerical/<br>Technical | 12               | 14                | 5     | 3        | 12                 | 3          | 1                 | 2     | 52           |
| Skilled<br>Worker      | 4                | 8                 | 1     | 1        | 8                  | 0          | 4                 | 0     | 26           |
| Unskilled<br>Worker    | 7                | 1                 | 2     | 0        | 2                  | 0          | 0                 | 0     | 12           |
| Housewives             | 12               | 14                | 6     | 0        | 15                 | 3          | 8                 | 2     | 60           |
| Retired                | 6                | 8                 | 2     | 1        | 6                  | 0          | 1                 | 2     | 26           |
| Students               | 7                | 4                 | 2     | 0        | 3                  | 1          | 3                 | 0     | 20           |
| Column Total           | 85               | 64                | 30    | 13       | 72                 | 10         | 17                | 12    | 303          |



#### II.3.4. Attitudes Toward Financing and Personal Impact

When it comes to the issue of how to finance pollution control, the patterns by income-education-occupation are not very strong, but none the less are quite interesting. As Tables II.17 - II.19 show, there is a discernible tendency for upper income, education and occupation groups to prefer federal to state or local financing and to have substantially more interest in having the polluter pay for pollution control.

When we ask how this program is to be financed (see Tables II.20 - II.22) there are also some very interesting differences. Most importantly, while opinion is divided in all categories, upper income and upper education groups favor to some extent higher taxes versus lower expenditures. Lower income groups show the reverse pattern. This says something interesting about willingness to pay via tax increases for pollution control. In terms of occupational categories, Housewives in particular favor expenditure reductions versus higher taxes, while teachers and retired respondents show the reverse. Indeed housewives' attitudes are ones they share with women in general, as the bottom lines on Table II.22 shows. A bit paradoxically, a willingness to tolerate higher prices, and a belief that control should be financed by lower profits--while each was only expressed by less than 10% of the sample--were also both relatively more upper income and education attitudes. No evidence appeared linking preferences for methods of financing with willingness to pay and we have not included those cross-tabulations in this report.

TABLE II, 17

CROSSTABULATION OF INCOME:PREFERRED SOURCE OF PAYMENT: BOSTON PHONE SURVEY

| Family Income | Local Gov't. | State Gov't. | Federal Gov't. | All Gov't. | Everyone Should | Everyone Will | Polluter | Taxpayer | Consumer | ROW TOTAL |
|---------------|--------------|--------------|----------------|------------|-----------------|---------------|----------|----------|----------|-----------|
|               |              |              |                |            |                 |               |          |          |          |           |
| Under \$3000  | 5            | 3            | 8              | 3          | 5               | 0             | 5        | 1        | 0        | 30        |
| \$3-5000      | 4            | 0            | 2              | 1          | 4               | 5             | 2        | 1        | 0        | 19        |
| \$5-10000     | 4            | 6            | 8              | 6          | 11              | 0             | 9        | 4        | 1        | 49        |
| \$10-15000    | 2            | 5            | 16             | 7          | 9               | 13            | 12       | 4        | 1        | 69        |
| \$15-20000    | 1            | 2            | 12             | 5          | 12              | 6             | 11       | 4        | 1        | 54        |
| \$20-25000    | 1            | 1            | 5              | 4          | 2               | 3             | 7        | 0        | 1        | 24        |
| Over \$25000  | 3            | 1            | 12             | 8          | 8               | 2             | 12       | 4        | 3        | 53        |
| Column Total  | 20           | 18           | 63             | 34         | 51              | 29            | 58       | 18       | 7        | 298       |
| Under 10,000  | 13           | 9            | 18             | 10         | 20              | 5             | 16       | 6        | 1        | 98        |
| Over 10,000   | 7            | 9            | 35             | 24         | 31              | 24            | 43       | 12       | 6        | 200       |

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TABLE II. 18

CROSSTABULATION OF EDUCATION:PREFERRED SOURCE OF PAYMENT: BOSTON PHONE SURVEY

| <u>Education</u>           | <u>Local State</u> |               |               |                   |               | <u>Everyone</u> |                 | <u>Polluter</u> | <u>Taxpayer</u> | <u>Consumer</u> | <u>ROW TOTAL</u> |
|----------------------------|--------------------|---------------|---------------|-------------------|---------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|
|                            | <u>Gov't.</u>      | <u>Gov't.</u> | <u>Gov't.</u> | <u>All Gov't.</u> | <u>Should</u> | <u>Will</u>     | <u>Everyone</u> |                 |                 |                 |                  |
| Higher Degree              | 1                  | 0             | 13            | 7                 | 9             | 4               | 18              | 7               | 3               |                 | 62               |
| College Degree             | 6                  | 4             | 18            | 10                | 15            | 12              | 21              | 4               | 2               |                 | 92               |
| Some Post Secondary        | 3                  | 5             | 11            | 9                 | 15            | 7               | 10              | 1               | 2               |                 | 63               |
| High School                | 5                  | 8             | 18            | 7                 | 13            | 6               | 7               | 8               | 0               |                 | 72               |
| Grade School               | 3                  | 1             | 3             | 1                 | 0             | 1               | 2               | 0               | 0               |                 | 11               |
| Less                       | 2                  | 0             | 0             | 1                 | 0             | 0               | 1               | 0               | 0               |                 | 4                |
| Column Total               | 20                 | 18            | 63            | 35                | 52            | 30              | 59              | 20              | 7               |                 | 304              |
| College and Higher Degrees | 7                  | 4             | 31            | 17                | 24            | 16              | 39              | 11              | 5               |                 | 154              |
| All Others                 | 13                 | 14            | 32            | 18                | 28            | 14              | 20              | 9               | 2               |                 | 150              |

TABLE II. 19

CROSSTABULATION OF OCCUPATION:PREFERRED SOURCE OF PAYMENT: BOSTON PHONE SURVEY

| Occupation         | Local<br>Gov't. | State<br>Gov't. | Federal<br>Gov't. | All<br>Gov't. | Everyone<br>Should | Everyone<br>Will | Polluter | Taxpayer | Consumer | ROW<br>TOTAL |
|--------------------|-----------------|-----------------|-------------------|---------------|--------------------|------------------|----------|----------|----------|--------------|
| Professionals      | 1               | 1               | 12                | 7             | 5                  | 5                | 10       | 2        | 2        | 45           |
| Teachers           | 1               | 1               | 5                 | 3             | 2                  | 1                | 10       | 1        | 0        | 24           |
| Managers           | 0               | 0               | 10                | 5             | 6                  | 4                | 9        | 2        | 1        | 37           |
| Clerical/Technical | 4               | 5               | 10                | 3             | 10                 | 4                | 10       | 15       | 1        | 52           |
| Skilled Workers    | 2               | 0               | 3                 | 4             | 6                  | 4                | 5        | 2        | 0        | 26           |
| Unskilled Workers  | 1               | 4               | 1                 | 1             | 1                  | 3                | 1        | 0        | 0        | 12           |
| Housewives         | 5               | 5               | 13                | 7             | 15                 | 4                | 5        | 5        | 1        | 60           |
| Retired            | 4               | 2               | 7                 | 3             | 3                  | 3                | 1        | 1        | 2        | 26           |
| Students           | 1               | 0               | 3                 | 2             | 3                  | 2                | 6        | 2        | 0        | 19           |

Column Total

19 18 64 35 51 30 57 20 7 301

P/T/M

|

2 2 27 15 13 10 29 5 3 106

All Others

17 16 37 20 38 20 28 15 4 195

TABLE II. 20

CROSSTABULATION OF INCOME:PREFERRED METHOD OF PAYMENT: BOSTON PHONE SURVEY

|                      | Higher<br>Prices | Gov't.<br>Subsidy | Higher<br>Taxes | Gov't.<br>Spend<br>Less | Fine/Tax<br>Polluter | Lower<br>Profit | Effluent<br>Charges | Other | ROW.<br>TOTAL |
|----------------------|------------------|-------------------|-----------------|-------------------------|----------------------|-----------------|---------------------|-------|---------------|
| <u>Family Income</u> |                  |                   |                 |                         |                      |                 |                     |       |               |
| under \$3000         | 0                | 1                 | 8               | 11                      | 4                    | 1               | 0                   | 2     | 27            |
| \$3-5000             | 0                | 0                 | 8               | 5                       | 0                    | 1               | 0                   | 3     | 17            |
| \$5-10000            | 2                | 1                 | 11              | 19                      | 9                    | 2               | 0                   | 2     | 46            |
| \$10-15000           | 7                | 1                 | 26              | 20                      | 8                    | 2               | 3                   | 0     | 67            |
| \$15-20000           | 3                | 3                 | 20              | 10                      | 7                    | 5               | 0                   | 4     | 52            |
| \$20-25000           | 5                | 0                 | 3               | 8                       | 3                    | 1               | 0                   | 2     | 22            |
| over \$25000         | 5                | 1                 | 17              | 14                      | 6                    | 5               | 0                   | 4     | 52            |
| Column Total         | 22               | 7                 | 93              | 87                      | 37                   | 17              | 3                   | 17    | 283           |

TABLE II. 21

CROSSTABULATION OF EDUCATION:PREFERRED METHOD OF PAYMENT: BOSTON PHONE SURVEY

| <u>Education</u>       | Higher<br>Prices | Gov't.<br>Subsidy | Higher<br>Taxes | Gov't.<br>Spend<br>Less | Fine/Tax<br>Polluter | Lower<br>Profit | Effluent<br>Charges | Other | ROW<br>TOTAL |
|------------------------|------------------|-------------------|-----------------|-------------------------|----------------------|-----------------|---------------------|-------|--------------|
| Higher Degree          | 10               | 2                 | 18              | 15                      | 8                    | 2               | 2                   | 3     | 60           |
| College Degree         | 4                | 2                 | 30              | 25                      | 11                   | 11              | 0                   | 5     | 88           |
| Some Post<br>Secondary | 7                | 1                 | 18              | 18                      | 8                    | 2               | 1                   | 5     | 60           |
| High School            | 1                | 3                 | 23              | 24                      | 8                    | 2               | 0                   | 4     | 65           |
| Grade School           | 0                | 1                 | 2               | 7                       | 1                    | 0               | 0                   | 0     | 11           |
| Less                   | 0                | 0                 | 3               | 0                       | 1                    | 0               | 0                   | 0     | 4            |
| Column Total           | 22               | 9                 | 94              | 89                      | 37                   | 17              | 3                   | 17    | 288          |

TABLE II. 22

CROSSTABULATION OF OCCUPATION:

PREFERRED METHOD OF PAYMENT: BOSTON PHONE SURVEY AND SEX WITH

| Occupation         | Higher<br>Prices | Gov't.<br>Subsidy | Higher<br>Taxes | Gov't.<br>Spend<br>Less | Fine/Tax<br>Polluter | Lower<br>Profit | Effluent<br>Charges | Other | ROW<br>TOTAL |
|--------------------|------------------|-------------------|-----------------|-------------------------|----------------------|-----------------|---------------------|-------|--------------|
| Professionals      | 5                | 2                 | 10              | 14                      | 4                    | 4               | 2                   | 2     | 43           |
| Teachers           | 1                | 0                 | 10              | 5                       | 4                    | 3               | 0                   | 1     | 24           |
| Managers           | 3                | 1                 | 11              | 10                      | 7                    | 3               | 1                   | 1     | 37           |
| Clerical/Technical | 6                | 2                 | 16              | 15                      | 6                    | 1               | 0                   | 2     | 48           |
| Skilled Workers    | 2                | 2                 | 9               | 8                       | 2                    | 2               | 0                   | 1     | 26           |
| Unskilled Workers  | 1                | 0                 | 6               | 1                       | 1                    | 0               | 0                   | 1     | 10           |
| Housewives         | 3                | 2                 | 14              | 25                      | 6                    | 1               | 0                   | 4     | 55           |
| Retired            | 0                | 0                 | 12              | 7                       | 2                    | 0               | 0                   | 3     | 24           |
| Students           | 1                | 0                 | 4               | 5                       | 5                    | 3               | 0                   | 0     | 18           |
| Column Total       | 22               | 9                 | 92              | 90                      | 37                   | 17              | 3                   | 15    | 285          |
| Men                | 15               | 3                 | 52              | 18                      | 19                   | 10              | 2                   | 5     | 124          |
| Women              | 5                | 3                 | 35              | 49                      | 11                   | 6               | 0                   | 10    | 120          |

Interestingly enough, there is very little variation in the extent to which people will say that their own efforts can make a difference as a function of income (Table II.23). However, when it comes to education and occupation the differences are quite evident. Teachers, professionals and those with higher degrees clearly perceived themselves as having moderately greater potential impact (Tables II.24 and II.25).

#### II.3.5. Summary

In general the phone survey found that preferences for and attitudes about the provision of environmental goods and services are related to income, education and occupation. While one can push the data too hard, there is some support for the thesis that over the middle range of incomes, willingness to pay rises faster than incomes. This is corroborated by expressed preferences as to financing options. One also notices throughout what appears to be the influence of general information and conceptual sophistication on people's answers. For example, consider the more frequent suggestion by upper income/education groups that we finance waste control from polluter's profits. Is this a function of differences in preferences or of greater familiarity with the structure of the problem and the possible solutions to it?

The results, of course, aggregate together all forms of environmental benefits: aesthetic, recreational, material, health, and ideological (see section I.2). From the water pollution point of view, the most important category of benefits that is potentially subject



TABLE 11. 23

## CROSSTABULATION OF INCOME BY PERCEIVED IMPACT

## BOSTON PHONE SURVEY

| Family Income | Low Impact     |       |             | High Impact |                   |  | Row Total |
|---------------|----------------|-------|-------------|-------------|-------------------|--|-----------|
|               | Strongly Agree | Agree | Indifferent | Disagree    | Strongly Disagree |  |           |
| Under \$3000  | 3              | 10    | 6           | 11          | 1                 |  | 31        |
| \$3-5,000     | 1              | 10    | 2           | 4           | 2                 |  | 19        |
| \$5-10,000    | 8              | 20    | 1           | 19          | 3                 |  | 51        |
| \$10-15,000   | 8              | 14    | 0           | 31          | 16                |  | 69        |
| \$15-20,000   | 10             | 14    | 4           | 16          | 11                |  | 55        |
| \$20-25,000   | 1              | 6     | 2           | 7           | 8                 |  | 24        |
| Over 25,000   | 10             | 14    | 1           | 20          | 8                 |  | 53        |
| Column Total  | 41             | 88    | 16          | 108         | 49                |  | 302       |

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TABLE II. 24

CROSSTABULATION OF EDUCATION BY PERCEIVED IMPACTBOSTON PHONE SURVEY

| Education           | Low Impact     |       |             | High Impact |                   |  | Row<br>Total |
|---------------------|----------------|-------|-------------|-------------|-------------------|--|--------------|
|                     | Strongly Agree | Agree | Indifferent | Disagree    | Strongly Disagree |  |              |
| Higher Degree       | 9              | 10    | 5           | 27          | 13                |  | 64           |
| College Degree      | 10             | 29    | 2           | 39          | 21                |  | 93           |
| Some Post Secondary | 10             | 28    | 3           | 17          | 6                 |  | 64           |
| High School         | 10             | 26    | 4           | 24          | 8                 |  | 72           |
| Grade School        | 2              | 5     | 1           | 3           | 0                 |  | 11           |
| Less                | 0              | 1     | 1           | 1           | 1                 |  | 4            |
| Column Total        | 41             | 91    | 16          | 111         | 49                |  | 308          |

TABLE II. 25

## CROSSTABULATION OF OCCUPATION BY PERCEIVED IMPACT

## BOSTON PHONE SURVEY

| Occupation         | Low Impact     |       |             | High Impact |                   |  | Row Total |
|--------------------|----------------|-------|-------------|-------------|-------------------|--|-----------|
|                    | Strongly Agree | Agree | Indifferent | Disagree    | Strongly Disagree |  |           |
| Professionals      | 7              | 9     | 2           | 16          | 12                |  | 46        |
| Teachers           | 2              | 3     | 2           | 15          | 3                 |  | 25        |
| Managers           | 6              | 13    | 0           | 14          | 4                 |  | 37        |
| Clerical Technical | 6              | 16    | 3           | 20          | 7                 |  | 52        |
| Skilled Workers    | 5              | 7     | 1           | 9           | 4                 |  | 26        |
| Unskilled Workers  | 1              | 9     | 0           | 2           | 0                 |  | 12        |
| Housewives         | 6              | 21    | 2           | 20          | 12                |  | 61        |
| Retired            | 3              | 6     | 3           | 11          | 3                 |  | 26        |
| Students           | 5              | 6     | 1           | 4           | 4                 |  | 20        |
| Column Total       | 41             | 90    | 14          | 111         | 49                |  | 305       |

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to more precise measurement is clearly recreation. Developing better data on such benefits was the purpose of our recreation survey, and that is the subject we now consider.

#### II.4. Recreation User Survey

In order to more adequately explore the benefits from water based recreation, we undertook a survey of recreation users. While the bulk of the sample was in the Boston area (almost 1400) we also performed substantial studies in the Seattle area (almost 300) to act as a point of comparison. The study strategy was intentionally aimed at acquiring a very large sample at a large number of sites, at the cost of obtaining only a small amount of information from each respondent. The survey instrument finally used was developed in the course of some preliminary efforts, which were made with a still shorter questionnaire (See Appendix II.B). For these reasons, in many of the tables that follow, the sample size is significantly below the 1680 to be found where the most complete data exist. In all, 25 sites were visited, which we have sorted in turn into 9 categories, depending upon the overall character of the site (see Table II.26).

In Analyzing the results of the survey we wish to consider primarily the determinants of site choice, distance travelled, frequency of use, and attitudes. These are all in a sense dependent variables. The purely exogenous variables are income and education. But the system is clearly in fact simultaneous. For example, site chosen and distance

TABLE II. 26

SITES SURVEYED, BY SITE CODEBoston One: Picnicking Only Sites

Fresh Pond Reservoir  
Banks of Charles River

Boston Two: Lower Quality Fresh Water Lakes

Mystic Lake  
Waldon Pond

Boston Three: Lower Quality In-City Beaches

Revere Beach  
Wollaston Beach  
Carson's Beach  
City Point Beach

Boston Four: Higher Quality Suburban Beaches

Nantasket  
Nahant  
Duxbury  
Scusset  
Salisbury

Boston Five: Cape Cod

Craigsville  
Coast Guard  
Sandy Neck

Boston Six: Higher Quality Fresh Water Lakes

Cochituate State Park  
Harold Parker State Park  
Miles Standish State Park

Seattle One: Puget Sound Beaches

Golden Gardens Beach  
Carkeek Beach

Seattle Two: Lake Washington Beaches

Madison Park Beach  
Green Lake Beach  
Seward Park  
Madrona Beach

Seattle Three: High Quality Inland Lake

Samamish State Park

travelled are literally inseparable aspects of a single choice. No doubt attitudes influence these choices, just as these characteristics in turn influence frequency of use. We will try to cover these variables successively, but unavoidably the exposition will be repetitious in parts.

#### II.4.1. The correlates of Site Choice and Distance Travelled

Begin by considering the relationship between distance travelled and site. The pattern exhibited by the data, while intuitively plausible, is none the less strong enough to be quite striking. (Table II.27) Four-fifths of the picknickers at Boston area sites came less than four miles, and well over half of them less than two miles. Only 14 of 416 at Cape Cod (Boston five) or the good quality state parks came this distance. Or to put it another way, at the three lower quality Boston sites (one, two, three) over 2/3 of the people came less than 6 miles, while at the three higher quality sites, less than 10% travelled such short distances. Quite similar patterns hold for Seattle where over half those at the in-city sites came less than four miles, while only 3 of 50 of Samamish State Park travelled these distances.

Now, of course, these distance variables are to an extent a function of population concentration. That is, more people do live closer to "downtown" sites. But that is hardly the whole story. The other part is quite simply that recreation users are willing to travel further to a higher quality site.